IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Carl G. de Marcken   Art Unit : 2144

Serial No. : 09/431,699   Examiner : Milan S. Kapadia

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Title : METHOD FOR GENERATING A DIVERSE SET OF TRAVEL OPTIONS

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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF ON BEHALF OF CARL G. DEMARCKEN (CORRECTED)

The brief fee of $330 has already been paid. Please apply any other charges or credits to Deposit Account No. 06-1050.

(1)   Real Party In Interest

The real party in interest in the above application is ITA Software, Inc.

(2)   Related Appeals and Interferences

The appellant is not aware of any appeals or interferences related to the above-identified patent application.

(3)   Status of Claims

This is an appeal from the decision of the Primary Examiner in an Office Action dated April 7, 2004, finally rejecting claims 1-9, 13-38 and 43-53, all of the claims of the above application. Claims 10-12 and 39-42 were canceled.

Claim 46 was rejected as being indefinite. The examiner contended that the limitation "establishing a plurality of travel requirement templates, for each travel requirement template" was circular.

Claims 1-9, 21 25-29, 32, 33, 38, and 43-45 were rejected under 35 U.S.C. § 102 (e) as anticipated by DeMarcken U.S. Patent 6,295,521.

Claims 13-20, 22, 23, 24 and 31 were rejected under 35 U.S.C. § 103 (a) as being obvious over DeMarcken U.S. Patent 6,295,521 in view of Webber et al. U.S. Patent 5,331,546.

Claim 30 was rejected under 35 U.S.C. § 103 (a) as being obvious over DeMarcken U.S. Patent 6,295,521.

Claims 34-38 and 46-53 were rejected under 35 U.S.C. § 103 (a) as being obvious over DeMarcken U.S. Patent 6,295,521 in view of Karch et al. U.S. Patent 6,442,537.

Appellant filed a Notice of Appeal on July 7, 2004.

(4)   Status of Amendments

Appellant did not file a response to the outstanding office action of April 7, 2004. All previously filed amendments have been entered.

(5)   Summary of Invention

Background

The invention relates to travel planning systems.

Computer travel planning systems such as airline computer reservation systems generally produce a relatively small set of recommended travel options for a query that has a route and/or time specification. For air travel, usually the number of travel options that a travel planning system produces is much smaller than the total set that could possibly satisfy a traveler's request. For example, a CRS may respond to a round-trip query specified by a departure city and date and a set of ten or so possible flight and fare combinations, even though there may be thousands of combinations of flights that satisfy the request.

In many cases, resource limitations prevent a travel planning system from analyzing or generating more than a small set of travel options. Moreover, for air travel it may be that for each option the system needs to query airlines about seat availability. The availability requirement places practical limits the number of options that may be considered.

Appellant's Invention

Appellant's invention is directed at a method for providing a set of diverse travel options. A large set of travel options is reduced to a smaller set of travel options that have diverse components based on a set of diverse travel requirements that represent conditions for a travel option to be considered for inclusion in the smaller set of diverse travel options. The method for producing diverse travel options can generate answers on several different airlines, times of day and so forth, thus satisfying a greater ranger of travel needs.

Thus, if a travel planning system is limited in the number of options it can generate, the travel planning system can generate a diverse set of travel options to maximize the probability of generating good options by enforcing diversity in the set of options generated.

References to the Specification

Appellant's FIG. 1 shows a travel planning system. The travel planning system includes a server computer 12 having a computer memory or storage media 14 storing a server process

15. The server process 15 includes a scheduler process 16 and a faring process 18. The scheduler process 16 is any suitable scheduler process that will produce from a travel request sets of flights that can satisfy the request. The faring process 18 is a process that determines a set of valid fares. The travel planning system 10 also includes a plurality of databases 20a, 20b that store industry-standard information pertaining to travel (e.g., airline, bus, railroad, etc.).

Referring to FIG. 2, a diversity process 50 for selecting a diverse set of travel options from a larger set of candidate travel options is shown. The diversity process 50 includes generating 52 an ordered list of travel requirements that represent conditions possibly required for a travel option to be considered the best travel option to generate. The diversity process 50 selects 54 for each travel requirement the one or more travel options that satisfy the requirement preferably by choosing those travel options that best satisfy one or more travel preference functions that can be used to order the travel options.

For example, the air travel planning system generates the following 10 travel requirements for a set of travel options that each include one or more flights.

1. <none>

2. all flights on American Airlines.

3. all flights on United Airlines.

4. non-stop.

5. departing in morning.

6. departing in evening.

7. non-stop on American Airlines.

8. non-stop on United Airlines.

9. non-stop in morning.

10. non-stop in evening.

For each of the requirements, the planning system selects 54 from the large set of candidate travel options e.g., the cheapest travel option that satisfies the requirement. The cheapest option is generated; the cheapest options all on American Airlines; the cheapest travel options all on United Airlines; the cheapest travel options that are non-stop; and so forth. These

travel options are displayed 56 to provide a traveler a desirable option even if the traveler has restrictions on the times the traveler can travel, or preferences for one airline over another. These options are possibly more desirable than if the system had merely generated and sent, e.g., the 10 cheapest solutions without regard to producing a diverse set of solutions taking into consideration preferences of the traveler.

Referring to FIG. 3, an example 60 of a diversity process 50 is shown. The diversity process 60 generates a diverse list of travel options from a larger set of travel options. The diversity process iterates through a set of travel requirements and selects the best travel option for each requirement. The diversity process 60 includes a procedure for generating a diverse list of (N) travel options (Rts) from a larger list of travel options (Ts) that are the best travel options for a set of travel requirements (R), as defined by an ordering function F. The diversity process 60 generates 62 a prioritized (ordered) list of requirements Rs, and sorts 64 the list of travel options (Ts) by function (F) to produce a best-first ordered list (Ts2). The diversity process 60 initializes the list of result travel options (RTs) to be empty. If the remaining list of requirements (Rs) is empty 6, the process 60 returns an ordered list of diverse travel options (Rts). Otherwise, the diversity process selects 66 the first travel requirement (R) from the ordered list of requirements (Rs) and removes 68 a requirement (R) from the requirement list (Rs). The diversity process 60 finds 70 a first (e.g., best) option T in the best-first ordered list (Ts2) that satisfies travel requirement (R).

If no option in the best-first ordered list (Ts2) satisfies 72 the requirement (R), the process 60 checks 74 if the remaining list of requirements (Rs) is empty. Otherwise, the diversity process determines 76 if a travel option T is not already in result travel options list (Rts). If the option T is not in the list (Rts), the diversity process adds 78 the travel option T to end of the result travel option list (Rts). The process tests 80 if the size of the result travel option list (Rts) is equal to or greater than N. If the size is equal to or greater than N, the process returns the ordered list of diverse travel options.

Referring to FIG. 4, the process 62 to generate a prioritized list of travel requirements is shown. The list may be a fixed list, for example the list of ten requirements in the example above. Alternatively, the list may be generated taking into account the number of solutions required, the ordering function, and the large set of candidate travel options. For example, the

list may be generated 62 by filling 92 in a set of template requirements. A sample set of templates for air travel is

1. no requirement.

2. all flights on <airline>

3. non-stop.

4. outbound departure in <morning or afternoon or evening>.

5. return departure in <morning or afternoon or evening>.

6. outbound departure date <date>.

7. return departure date <date>.

8. non-stop on <airline>.

9. outbound departure date <date1> and return departure date <date2>.

The large candidate set of travel options is analyzed 94 to find all parameters e.g., airlines found in any travel option, all departure dates for outbound and return, and all departure parts-of-day (morning, afternoon, evening) for outbound and return. The ordered list of requirements is generated by filling 96 in for each template all airlines, dates and parts-of-day present in the options.

The diversity process 60 can be run more than once with different travel option preference functions (a set of F's). For example, a travel planning system may output diverse travel options that are inexpensive, and diverse options that are convenient, reflecting uncertainty in whether a traveler is cost-sensitive or convenience-sensitive.

(6)   Issues

The issues to be decided on appeal are:

1.   Did the examiner properly reject Claim 46 under 35 U.S.C. 112, second paragraph being indefinite?

2.   Did the Examiner properly reject claims 1-9, 21 25-29, 32, 33, 38, and 43-45 under 35 U.S.C. § 102 (e) as anticipated by DeMarcken U.S. Patent 6,295,521?

3.   Did the Examiner properly reject claims 13-20, 22, 23, 24 and 31 under 35 U.S.C. § 103 (a) as being obvious over DeMarcken U.S. Patent 6,295,521 in view of Webber et al. U.S. Patent 5,331,546?

4.   Did the Examiner properly reject claim 30 under 35 U.S.C. § 103 (a) as being obvious over DeMarcken U.S. Patent 6,295,521?

5.   Did the Examiner properly reject claims 34-38 and 46-53 under 35 U.S.C. § 103 (a) as being obvious over DeMarcken U.S. Patent 6,295,521 in view of Karch et al. U.S. Patent 6,442,537?

(7)   Grouping of Claims

Claims 1-9, 13-38 and 43-53 do not stand or fall together. Appellant's claims will be argued in separate groupings as defined below.

Group I has claims 1, 4-9, 25;

Group II has claims 2 and 3;

Group III is claim 13;

Group IV has claims 14-20 each argued individually;

Group V is claim 21-24;

Group VI has claims 26 and 27;

Group VII has claims 28-33, 43, 44, 45.

Group VIII has claims 34-36.

Group IX has claims 37 and 38.

Group X has claims 46-53.

(8)   Argument

1.   The Examiner improperly rejected Claim 46 under 35 U.S.C. 112, second paragraph being indefinite.

2.   The Examiner improperly reject claims 1-9, 21 25-29, 32, 33, 38, and 43-45 under 35 U.S.C. § 102 (e), as anticipated by DeMarcken U.S. Patent 6,295,521.

3. The Examiner also improperly reject claims 13-20, 22, 23, 24 and 31 under 35 U.S.C. § 103 (a) as being obvious over DeMarcken U.S. Patent 6,295,521 in view of Webber et al. U.S. Patent 5,331,546.

4. The Examiner improperly reject claim 30 under 35 U.S.C. § 103 (a) as being obvious over DeMarcken U.S. Patent 6,295,521.

5. The Examiner improperly reject claims 34-38 and 46-53 under 35 U.S.C. § 103 (a) as being obvious over DeMarcken U.S. Patent 6,295,521 in view of Karch et al. U.S. Patent 6,442,537.

Indefiniteness

The second paragraph of 35 U.S.C. §112 requires that the specification conclude with one or more claims that particularly point out and distinctly claim the subject matter that the applicant regards as his invention.

Obviousness

"It is well established that the burden is on the PTO to establish a prima facie showing of obviousness, *In re Fritsch*, 972 F.2d. 1260, 23 U.S.P.Q.2d 1780 (C.C.P.A., 1972)."

"It is well established that there must be some logical reason apparent from the evidence or record to justify combination or modification of references. *In re Regal*, 526 F.2d 1399 188, U.S.P.Q.2d 136 (C.C.P.A. 1975). In addition, even if all of the elements of claims are disclosed in various prior art references, the claimed invention taken as a whole cannot be said to be obvious without some reason given in the prior art why one of ordinary skill in the art would have been prompted to combine the teachings of the references to arrive at the claimed invention. Id. Even if the cited references show the various elements suggested by the Examiner in order to support a conclusion that it would have been obvious to combine the cited references, the references must either expressly or impliedly suggest the claimed combination or the Examiner must present a convincing line of reasoning as to why one skilled in the art would have found the claimed invention obvious in light of the teachings of the references. *Ex Parte Clapp*, 227 U.S.P.Q.2d 972, 973 (Board. Pat. App. & Inf. 1985)."

"The mere fact that the prior art could be so modified would not have made the modification obvious unless the prior art suggested the desirability of the modification." *In re Gordon*, 221 U.S.P.Q. 1125, 1127 (Fed. Cir. 1984).

> Although the Commissioner suggests that [the structure in the primary prior art reference] could readily be modified to form the [claimed] structure, "[t]he mere fact that the prior art could be so modified would not have made the modification obvious unless the prior art suggested the desirability of the modification." *In re Laskowski*, 10 U.S.P.Q. 2d 1397, 1398 (Fed. Cir. 1989).

"The claimed invention must be considered as a whole, and the question is whether there is something in the prior art as a whole to suggest the desirability, and thus the obviousness, of making the combination." *Lindemann Maschinenfabrik GMBH v. American Hoist & Derrick*, 221 U.S.P.Q. 481, 488 (Fed. Cir. 1984).

> Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination. Under Section 103, teachings of references can be combined only if there is some suggestion or incentive to do so. *ACS Hospital Systems, Inc. v. Montefiore Hospital*, 221 U.S.P.Q. 929, 933 (Fed. Cir. 1984) (emphasis in original, footnotes omitted).

"The critical inquiry is whether 'there is something in the prior art as a whole to suggest the desirability, and thus the obviousness, of making the combination.'" *Fromson v. Advance Offset Plate, Inc.*, 225 U.S.P.Q. 26, 31 (Fed. Cir. 1985).

Discussion

Indefiniteness Rejection

The examiner rejected Claim 46 because the examiner considered the limitation "establishing a plurality of travel requirement templates, for each travel requirement template" circular. This limitation is not circular. Rather, as recited in claim 46 reproduced below, the

phrase "for each travel requirement template" is predicate that is used to delineating the action

involved in establishing the travel requirement templates. Thus, the phrase recites that in the

action of establishing the plurality of travel requirement templates, for each of the templates the

method includes defining a plurality of travel requirements ***. A person of ordinary skill in the

art would understand the metes and bounds of this claim. Therefore, Claim 46 is definite.

> 46.   A method for generating a diverse set of travel
> options, the method comprising:
>> determining a candidate set of travel options, the
> candidate set of travel options being based on user input;
>> defining a set of diversity requirements, with
> defining comprising:
>>> establishing a plurality of travel requirement
>> templates, for each travel requirement template,
>>>> defining a plurality of travel requirements,
>>> each of the travel requirements corresponding to a
>>> different value of the respective travel requirement
>>> template to produce the set of diversity
>>> requirements, and for each travel requirement in the
>>> set of diversity requirements,
>>> selecting from the candidate set of travel options a
>> travel option that satisfies that travel requirement;
>> combining the selected travel options for the travel
> requirements to generate the diverse set of travel options;
> and
>> displaying the diverse set of travel options to a user.

Prior Art Rejections

> Group I (claims 1, 4-9 and 25)

Claim 1 is representative of this group of claims. Claim 1 is directed to a method for

providing a set of diverse travel options. Claim 1 includes the features of reducing a larger set of

travel options to a smaller set of diverse travel options in accordance with diverse travel

requirements that represent conditions for a travel option to be considered for inclusion in the set

of diverse travel options. Claim 1 also requires at least first and second travel options satisfy

first and second travel requirements, with the first and second travel requirements representing

different values in a category of travel requirements. The travel options include a flight and fare combination.

Claim 1 is directed at the problem of insuring that a travel planning system returns a list of diverse travel options. Neither DeMarcken nor the other references address this subject matter. DeMarcken is directed to a travel planning system in which a pricing graph is used to represent a large set of pricing solutions, e.g., travel options. The pricing graph is includes nodes that represent scheduling and faring information. DeMarcken teaches to use enumeration functions to extract from the pricing graph a set of pricing solutions.

The examiner contends that: "DeMarcken discloses *** reducing a larger set of travel options to a smaller set of diverse travel options in accordance with diverse travel requirements that represent conditions for a travel option to be considered for inclusion in the set of diverse travel options that includes at least first and second travel options that satisfy first and second travel requirements." *(Page 4 of the final rejection)*. The examiner also states: "The examiner interprets 'the pricing graph as a larger set of travel options' and the 'extracted pricing solutions as a smaller set of diverse travel options'."

Claim 1 requires reducing a larger set of travel options to a smaller set of diverse travel options and that *** the travel options represent a flight and fare combination. DeMarcken's teaching of the pricing graph is not the same as a larger set of travel options, as recited in claim 1. DeMarcken is clear that the pricing graph is a data structure that represents a very large set of travel options as sets of nodes that hold fares and flights. However, deMarcken's pricing graph is not a list of travel options. A list of travel options in DeMarcken is produced when one of the enumeration functions is applied to the pricing graph to extract pricing solutions (travel options). Therefore, the examiner's interpretation and reasoning is flawed.

As discussed in DeMarcken, an enumeration function is applied to the pricing graph to extract, e.g., pricing solutions according to a criterion. However, Claim 1 specifically requires at least first and second travel options corresponding to first and second travel requirements where the second travel requirement represents a different value in a category identical to the first travel requirement. Thus, DeMarcken does not teach to reduce a larger set of travel options to a smaller set of diverse travel options.

DeMarcken also does not disclose that the small set of travel options are diverse travel options. DeMarcken does not disclose reducing the larger set *** by selecting travel options for each of a plurality of diverse travel requirements. The portions of DeMarcken cited by the examiner (i.e., col. 49, lines 30-44, fig. 18, and col. 50, lines 22-39) do not disclose first and second travel options that satisfy first and second travel requirements, with the first and second travel requirements representing different values in a category of travel requirements. For example, page 5 of Appellant's specification teaches travel requirements 2 and 3, which are "all flights on American Airlines" and "all flights on United Airlines," respectively. Here, both travel requirements correspond to the category of all flights on a particular airline. The different values for these two specific examples are "American Airlines" and "United Airlines." Similarly, travel requirements 5 and 6 correspond to the category of flights departing at a particular segment of time, with the different values being "morning" and "evening." In this specific example, diversity is ensured because the set of travel options will include flights on American and on United, regardless of which are the cheapest or most convenient (e.g., non-stop). Because DeMarcken does not disclose every limitation of claim 1, a rejection of claim 1 under 35 U.S.C. § 102 is improper.

Group II (claims 2 and 3)

Claim 2 is representative of this group of claims. Claim 2 requires reducing a larger set of travel options to a smaller set of diverse travel options by generating one or more travel options consistent for each of the diversity of travel requirements. The examiner rejected claim 2 on the basis that Col. 49, lines 31-58 of DeMarcken disclosed that feature *(Office Action of May 8, 2002, page 4)*. DeMarcken does not talk about diversity of travel requirements and does not suggest generating one or more travel options consistent for each of the diversity of travel requirements.

Group III (claim 13)

Claim 13 is representative of this group of claims. Claim 13 requires generating a diverse list of travel options Rts from a larger list of travel options Ts. In claim 13, the diverse set is provided by generating a prioritized ordered list of requirements Rs, which the examiner

considers being taught by deMarcken. Neither deMarcken nor Webber whether taken together or separately describes or suggests these elements.

The examiner admits that the remaining elements of claim 13 are not taught by deMarcken, and thus uses the teachings of Webber at FIG. 4A items 60, 62 and 64 to teach these features. Webber describes at col. 8 lines 9-30 states:

> ***Any airport which is found in this search is added to a temporary list called a From List. At step 60 processor 18 again searches tariff file 20, but this time for all airports from which there are direct flights to the destination location of the trip being planned, and places all finds in another temporary list called a To List. For example, if the origin is JFK airport and the destination is Los Angeles International airport, the From List would contain cities (in the U.S.A. in this example) such as Kansas City, St. Louis and Chicago which have direct flights from JFK, and the To List would contain those cities (again in the U.S.A.-in this example) from which there are direct flights to Los Angeles International. In this example each of these two lists would contain well over 50 cities. At step 62 processor 18 starts a sequence designed to find candidate itineraries each of which would consist of connecting rather than direct flights. To start this, at step 62 processor 18 looks for possible 2-leg routes from the origin to the destination of the trip request being processed, by searching the From List and the To List for any airports which are in both lists and to thereby create another temporary list, of airports which are common to the From and To lists. For an airport to qualify for this Common Airport List there must be a direct flight leg from the origin (JFK) to that airport (e.g., Atlanta) and there must be a direct flight from that airport (Atlanta) to the destination (O'Hare). If the test at step 64 determines that the Common Airport List is empty, i.e., there is no airport to which there is direct flight from the origin and from which there is a direct flight to the destination (i.e., that there are no candidate 2-leg itineraries), the process goes to step 66 to see if any 3-leg itineraries can become candidates; to this end step 66 is a search in the tariff file and the From and To lists for all direct flights from any airport in the From list to any airport in the To list, i.e., to find each pair of airports in which (1) one of the airports in a pair is in the From List and the other is in the To List and (2) there is a direct flight between the airports in the pair.

These teachings are directed to a scheduling process to find direct and connecting flights between two airports. As with deMarcken, Webber neither describes nor suggests generating a prioritized ordered list of requirements Rs and sorting the list of travel options Ts by an ordering function F to produce a best-first ordered list Ts2. In addition, neither of the references suggests selecting a travel requirement R1 from the list of requirements Rs.

The examiner incorrectly interprets Webber as reading on the elements of claim 13. However, in this interpretation exercise, the examiner confuses travel requirements and travel options. These are distinct elements in appellant's specifications and claims. In claim 13, travel options are selected according to a set of travel requirements (R1 and R2) to insure that the set of travel options that are eventually returned to the user will exhibit some degree of diversity according to the travel requirements. However, in Webber, the flight search process merely selects flights. For instance, Webber teaches: "At step 60 processor 18 again searches tariff file 20, but this time for all airports from which there are direct flights to the destination location of the trip being planned, and places all finds in another temporary list called a To List." *(Webber Col. 8 lines 9-13).* In Webber, flights are selected on the basis of airports from which there are direct flights to the destination, not according to a set of travel requirements to insure that a set of travel options will exhibit some degree of diversity according to the travel requirements.

The remaining elements in claim 13 are likewise not disclosed by Webber. Claim 13 requires identifying a travel option T1 in the ordered list Ts2 that satisfies the travel requirement R1 that represents a value in a category of travel requirements. The examiner states that: "The Examiner interprets step 62 as the "R1" requirement *(Office Action page 9)*." Webber is clear that step 62 is directed at finding candidate itineraries, "which would consist of connecting rather than direct flights." *(Webber Col. 8, Lines 23,24)* This teaching has no relevance to identifying a travel option T1 in the ordered list Ts2 that satisfies the travel requirement R1 that represents a value in a category of travel requirements. As used in Appellant's specification and claims travel options and travel requirements are distinct.

Webber also does not suggest selecting a second travel requirement R2 from the list of requirements Rs, for analogous reasons. While Webber does identify a travel option, Webber does not identify a travel option in the ordered list Ts2 that satisfies travel requirement R2 that represents a different value in the category of the first travel requirement R1. Since, Webber

does not suggest any need or mechanism for insuring diversity in the answers, e.g., travel options that are returned, Webber cannot teach to and add the travel option to the diverse list of travel options.

According, since neither Webber nor deMarcken teach the features of claim 13, as argued above, the combination of the references neither describe nor suggest Appellant's claimed invention.

Group IV (claims 14-20)

Claim 14 is representative of this group of claims. In addition, since claims 14-19 recite detailed actions required to carry out the claimed method, these claims are also individually patentable and argued separately within this group of claims.

Claim 14 depends on claim 13 and is directed to the feature of when to return the ordered list, e.g., if the remaining list of requirements Rs is empty. The examiner interprets Webber's teachings: "save as one of the six best preference itineraries" and "sort the selected entries by departure time and display them and their best fares to the travel arranger" as returning an ordered list. The examiner contends that there is motivation to combine these teachings with deMarcken for the purpose of "rapidly sifting through what may be thousands of currently available flights, fares and rules for a given trip and to find the lowest fare for which a particular traveler and trip qualify and for which seats are available." *(Final Office Action page 11).*

Appellant contends that the quote language does not suggest the features of claim 14 and even if one were to construe the teachings of Webber as suggesting those features, the examiner's motivation is insufficient to suggest combining these construed teachings to a modification of deMarcken. Webber's teachings of: "six best preference itineraries" are not for the purpose of diversity in travel options, nor would these preferences inherently produce diverse travel options.

Claim 14 is directed to the feature used in determining when a diverse set of travel options have been obtain. The set of diverse travel options is obtained when the list of requirements is empty. Webber teaches no such list of requirements. Webber merely has a set of individual preferences for a traveler and a corporate travel policy, which are compared to arrive at a set of flights.

Processing in Webber does not involve removing the preferences or the travel policy from a list to arrive at an empty list of requirements. It merely compares potential flights and fares to the preference and the policy to see if they can be in a list of flights and fares. Webber cannot insure any degree of diversity in such a list of flights and fares, since Webber does not produce such an empty list of requirements. Moreover, Webber does not teach to arrange the preferences or travel policy to produce a diverse set of travel options. Rather, it would appear that the opposite is obtained, i.e., an ordered list of flights that share a common set of properties and thus are totally lacking in diversity.

Claim 15 depends on claim 14 and recites initializing the list of result travel options Rts to be empty; and if the remaining list of requirements Rs is not empty, selecting a first travel requirement R from the ordered list of requirements (Rs); and removing a requirement R from the requirement list (Rs).

The Examiner considers Webber at Col 8 lines 35-50 and Figure 6A and 6B, as teaching these features. However, Webber has no such teaching. Rather, Webber describes a scheduling process to find itineraries by use of routings. Processing in Webber does not involve removing the preferences or the travel policy from a list to arrive at an empty list of requirements. Processing in Webber merely compares potential flights to the preference and the policy in order to rank the list of flights according to the preference and travel policy. Webber cannot insure any degree of diversity exists in that ordered list since Webber does not produce an empty list of requirements by removing requirements from the list. Moreover, Webber does not have any teachings that the preferences or travel policy are arranged to produce a diverse set of travel options. Rather, it would appear that the opposite is taught, e.g., a list of flights and fares are provides to the travel arranger that all share a common set of properties and thus are totally lacking in diversity.

Claim 16, which depends from claim 15, includes finding a first option T in a best-first ordered list (Ts2) that satisfies travel requirements R. Webber does not suggest this feature. Similarly, claim 17, which depends from claim 16, and includes determining whether any option in the Ts2 satisfies the travel requirement, is not suggested by Webber. Appellant submits that the remaining claims in this group each include at least one feature that is not suggested by the combination of deMarcken and Webber.

Group V (claims 21-24)

Claim 21 is representative of this group. In addition, claims 22-24 recite detailed instructions to provide the computer program product. These claims are also individually patentable for similar reasons as discussed in Group IV.

As for claim 21, Neither deMarcken nor Webber describes or suggests separately or in combination a travel planning system including the feature of a computer system that outputs a set of travel options, smaller than a complete set of travel options that the computer has computed by pruning the complete set of travel options with a diversity-based pruning process. Appellant uses a diversity-based pruning process that produces at least one travel option in a smaller set that satisfies a first travel requirement and at least one other travel option in the smaller set that satisfies a second travel requirement, with the first and second travel requirements representing different values in a category of travel requirements.

Group VI (claims 26 and 27)

Claim 26 is not suggested by the references. Claim 26 includes reducing a larger set of travel options to a smaller set of diverse travel options in accordance with diverse travel requirements that represent conditions for a travel option to be considered for inclusion in the smaller set of diverse travel options. Claim 26 also requires that the first and second travel requirements represent different values in a category of travel requirements, which is not suggested by the references. Neither deMarcken nor Webber suggests these features, as generally argued above. Claim 26 further recites that for each of the diverse travel requirements, at least one travel option in the set of diverse travel options represents a best travel option from the larger set of travel options for that specific travel requirement. This later element is analogous to the preferences and travel policy teachings of Webber, and when combined with the remaining elements of claim 26, further serves to differentiate those remaining elements of the claim over deMarcken and Webber.

Group VII (claims 28-33, 43, 44, 45)

Claim 28 is representative of this grouping and calls for a method for generating a diverse set of travel options. Distinguishing features of claim 28 include receiving a candidate set of

travel options, and for a plurality of travel requirements with first and second travel requirements representing different values in a category of travel requirements, selecting one or more travel options for a specified travel requirement that satisfies that specified travel requirement. Neither deMarcken nor Webber discloses these features. In the teachings relied on by the examiner Webber is dealing only with flights and not travel options. In addition, Webber does not receive a candidate set of travel options and does not select those options according to first and second travel requirements. While, the examiner contends that deMarcken receives a set of travel options, that contention is incorrect. DeMarcken teaches that the pricing graph represents travel options. An enumeration function operates on the pricing graph to extract pricing solutions (e.g., travel options). However, deMarcken does not suggest that the enumeration is performed according to a first travel requirement and a second travel requirement. Webber adds nothing to deMarcken. Webber, as discussed above, is dealing with scheduling processing, e.g., finding flights, and not pricing solutions or travel options. Accordingly, at least for these reasons claims in this group are allowable.

Group VIII (claims 34-36)

Claim 34 is representative of this group. Claim 34 further limits claim 28 and defines a template of travel requirements. A template is used to fill in and, e.g., provide an ordered list of travel requirements. Thus, as Appellant discusses:

> A sample set of templates for air travel is
> 1. no requirement.
> 2. all flights on <airline>
> 3. non-stop.
> 4. outbound departure in <morning or afternoon or evening>.
> 5. return departure in <morning or afternoon or evening>.
> 6. outbound departure date <date>.
> 7. return departure date <date>.
> 8. non-stop on <airline>.
> 9. outbound departure date <date1> and return departure
> date <date2>.'

For instance, "all flights on <airline>" is a travel requirement "all flights on" with a field "<airline>" to specify a value e.g., Delta, American, and so forth. Filling in this value allows the

travel options to be returned with those airlines automatically included. Neither Webber nor deMarcken suggest this arrangement.

The examiner admits that neither Webber nor deMarcken describe templates. The examiner relies on Karch for this teaching. Karch is directed to the use of rule templates in the field of artificial intelligence. However, the examiner has not shown how Karch's rules are at all relevant to the template of travel requirements. In claim 34, the templates are not rules per se but are vehicles for holding values used in a process to assure diversity in travel options.

Group IX (claims 37 and 38)

Claim 37 is dependant on claim 34. Claim 37 sets out features of the template as including: travel on a particular carrier, non-stop travel, outbound travel departing in a predefined time period, return travel departing in a predefined time period, non-stop travel on a particular airline, or travel with an outbound departure on a first predefined date and a return arrival on a second predefined date. Neither Webber nor deMarcken teach a template that includes the aforementioned items. These items however, are not rules, but are values that are assigned to the fields in the template.

Group X (claims 46-53)

Claim 46 is representative of this group of claims. Claim 46 is directed to a method for generating a diverse set of travel options. Claim 46 includes the features of determining a candidate set of travel options and selecting from the candidate set of travel options a travel option that satisfies that travel requirement ... to generate the diverse set of travel options. These features are not suggested for reasons discussed above. Claim 46 further details the features of defining the set of diversity requirements. Claim 46 includes establishing a plurality of travel requirement templates, for each travel requirement template, defining a plurality of travel requirements, each *** corresponding to a different value of the respective travel requirement template to produce the set of diversity requirements. Neither Webber nor deMarcken suggest this feature. The examiner contends that deMarcken teaches these features at col. 50, lines 41-49 and col. 60 lines 47-55. However, deMarcken in those passages is describing how a value

function is applied to the nodes of a pricing graph and how a user uses the graphical user interface and the relation of the value functions to the graphical user interface.

Nowhere does Karch define a plurality of travel requirements, each *** corresponding to a different value of the respective travel requirement template to produce the set of diversity requirements. As was discussed above, the teachings of Karch do not deal with defining a plurality of travel requirements or using a template to populate values used in a diversity searching process. Rather, Karch is dealing with a system for use in artificial intelligence.
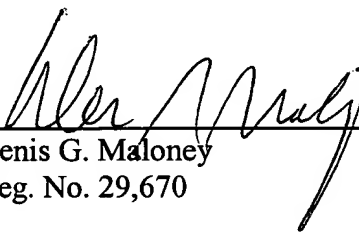
Conclusion

Appellant submits, therefore, that Claims 1-9, 13-38 and 43-53 are allowable over the cited art and claim 46 is proper under 35 U.S.C. 112, second paragraph. Therefore, the Examiner erred in rejecting Appellant's claims and should be reversed.

Respectfully submitted,

Date:_____

Denis G. Maloney
Reg. No. 29,670

Fish & Richardson P.C.
225 Franklin Street
Boston, MA 02110-2804
Telephone: (617) 542-5070
Facsimile: (617) 542-8906

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Appendix of Claims (corrected)

1.   A method for providing a set of diverse travel options, the method comprising:

reducing a larger set of travel options to a smaller set of diverse travel options in accordance with diverse travel requirements that represent conditions for a travel option to be considered for inclusion in the set of diverse travel options that includes at least first and second travel options that satisfy first and second travel requirements, with the first and second travel requirements representing different values in a category of travel requirements, and the travel options including a flight and fare combination.

2. The method of claim 1 wherein reducing a larger set of travel options to a smaller set of diverse travel options comprises:

generating one or more travel options consistent for each of the diversity of travel requirements.

3.   The method of claim 1 wherein reducing a larger set of travel options to a smaller set of diverse travel options comprises:

generating one or more desired travel options consistent with diversity of travel requirements.

4. The method of claim 1 wherein reducing a larger set of travel options to a smaller set of diverse travel options further comprises:

generating one or more of the best travel options consistent with a diversity of travel requirements where the travel requirements are dependent on the original set of travel options.

5.   The method of claim 1 wherein the set of travel requirements includes requirements for different airlines.

6.   The method of claim 1 wherein the set of travel requirements includes requirements for travel times of day, travel dates, numbers of stops, arrival pr departure airports, and cabin class.

7.   The method of claim 1 wherein the set of travel requirements includes requirements that are combinations of other requirements.

8.   The method of claim 7 wherein the set of travel requirement combinations include outbound and return travel dates or times of day.

9.   The method of claim 7 wherein the set of travel requirements combinations include airlines and number of stops, arrival and departure airports.

Claims 10-12. (Cancelled)

13.   A method generating a diverse list of [N] travel options Rts from a larger list of travel options Ts, comprises:

    generating a prioritized ordered list of requirements Rs;

    sorting the list of travel options Ts by an ordering function F to produce a best-first ordered list Ts2;

    selecting a travel requirement R1 from the list of requirements Rs;

    identifying a travel option T1 in the ordered list Ts2 that satisfies the travel requirement R1 that represents a value in a category of travel requirements;

    adding the travel option T1 to the diverse list of travel options Rts;

    selecting a second travel requirement R2 from the list of requirements Rs;

    identifying a travel option T2 in the ordered list Ts2 that satisfies travel requirement R2 that represents a different value in the category of the first travel requirement R1; and

    adding the travel option T2 to the diverse list of travel options Rts.

14. The method of claim 13 further comprising:

initializing the list of result travel options Rts to be empty; and if the remaining

list of requirements Rs is empty,

returning an ordered list of diverse travel options Rts.

15. The method of claim 14 further comprising:

initializing the list of result travel options Rts to be empty; and if the remaining

list of requirements Rs is not empty,

selecting a first travel requirement R from the ordered list of requirements (Rs);

and

removing a requirement R from the requirement list (Rs).

16. The method of claim 15 further comprising:

finding a first option T in a best-first ordered list (Ts2) that satisfies travel

requirements R.

17. The method of claim 16 further comprising:

determining whether any option in the Ts2 satisfies the travel requirement.

18. The method of claim 17 wherein if no option in Ts2 satisfies R, the method

further comprises:

checking if the remaining list of requirements Rs is empty.

19. The method of claim 18 wherein if the diversity process determines if a travel

option T is not already in the result list Rts,

adding the travel option T to end of the result travel option list Rts; and

determining if the size of the travel option list Rts is equal to or greater than N the

process in order to return the ordered list of diverse travel options.

20.   The method of claim 15 further comprising:

determining for each travel requirement R2 and Rs, whether the requirement R2 includes a requirement R, and T satisfies R2, and if T satisfies R2;

removing R2 from Rs.

21.   A travel planning system comprising:

a computer system that outputs a set of travel options, smaller than a complete set of travel options that the computer has computed, by pruning the complete set of travel options to a smaller set with a diversity-based pruning process, wherein the diversity-based pruning process produces at least one travel option in the smaller set that satisfies a first travel requirement and at least one other travel option in the smaller set that satisfies a second travel requirement, with the first and second travel requirements representing different values in a category of travel requirements.

22.   The travel planning system of claim 21 wherein the diversity-based pruning process comprises instructions to cause the system to:

generate a diverse list of N travel options Rts from a larger list of travel options Ts,

generate a prioritized ordered list of requirements Rs; and

sort the list of travel options Ts by an ordering function F to produce a best-first ordered list Ts2 with the list of options being optimized travel options for a set of travel requirements R in accordance with the ordering function F.

23.   The travel planning system of claim 22 further comprising instructions to cause the system to:

initialize the list of result travel options Rts to be empty; and if the remaining list of requirements Rs is empty,

return an ordered list of diverse travel options Rts.

24. The travel planning system of claim 23 further comprising instructions to cause the system to:

initialize the list of result travel options Rts to be empty; and if the remaining list of requirements Rs is not empty,

select a first travel requirement R from the ordered list of requirements (Rs); and

remove a requirement R from the requirement list (Rs).

25. The method of claim 1 wherein reducing a larger set of travel options to a smaller set of diverse travel options further comprises: evaluating for the travel requirements a set of travel preference functions used to order the larger set of travel options.

26. A method executed in a computer system to output a set of travel options, the method comprising:

reducing a larger set of travel options to a smaller set of diverse travel options in accordance with diverse travel requirements that represent conditions for a travel option to be considered for inclusion in the smaller set of diverse travel options that includes at least first and second travel options that satisfy first and second travel requirements,

with the first and second travel requirements representing different values in a category of travel requirements, and for each of the diverse travel requirements, at least one travel option in the set of diverse travel options representing a best travel option from the larger set of travel options for that specific travel requirement.

27. The method of claim 26 wherein each of the travel options comprise an itinerary and a price.

28. A method for generating a diverse set of travel options, the method comprising:

receiving a candidate set of travel options;

for a plurality of travel requirements, with first and second travel requirements representing different values in a category of travel requirements, selecting one or more

travel options for a specified travel requirement that satisfies that specified travel requirement; and

combining the travel options selected for the plurality of travel requirement to generate the diverse set of travel options that includes at least first and second travel options that satisfy the first and second travel requirements.

29. The method of claim 28 further comprising rendering the diverse set of travel options on an output device.

30. The method of claim 28 further comprising eliminating from the plurality of travel requirements a third travel requirement when the one or more travel options selected for a fourth travel requirement satisfy the first travel requirement.

31. The method of claim 28 wherein at least one of the travel requirements within the plurality is not a user entered travel requirement.

32. The method of claim 28 wherein the category for travel requirements comprise, travel on a particular carrier, number of stops, outbound travel departing in a predefined time period, return travel departing in a predefined time period, non-stop travel on a particular airline, or travel with an outbound departure on a first predefined date and a return arrival on a second predefined date.

33. The method of claim 32 wherein the values for the predefined time period comprise morning, afternoon, evening or a predefined date.

34. The method of claim 28 further comprising defining a template of travel requirements.

35. The method of claim 34 further comprising generating the plurality of travel requirements based at least in part on the template and the candidate set of travel options.

36. The method of claim 34 further comprising analyzing the candidate set of travel options to determine parameter values for the template.

37. The method of claim 34 wherein the template comprises travel on a particular carrier, non-stop travel, outbound travel departing in a predefined time period, return travel departing in a predefined time period, non-stop travel on a particular airline, or travel with an outbound departure on a first predefined date and a return arrival on a second predefined date.

38. The method of claim 37 wherein the predefined time period comprises morning, afternoon, evening or a predefined date.

Claims 39-42. (Cancelled)

43. An article of manufacture having computer-readable program portions embodied therein for generating a diverse set of travel options, the article comprising instruction for causing a processor to:

receive a candidate set of travel options;

generate a plurality of travel requirements, with first and second travel requirements representing different values in a category of travel requirements;

select one or more travel options for each of the plurality of travel requirement that satisfy that respective travel requirement; and

combine the one or more travel options selected for each requirement to generate a diverse set of travel options that includes at least first and second travel options that satisfy the first and second travel requirements.

44. An article of manufacture having computer-readable program portions embodied therein for generating a diverse set of travel options, the article comprising instructions for causing a processor to:

generate a first ordered set of travel options using a first preference function;

select travel options from the first set, the selected travel options corresponding to a plurality of diverse travel requirements;

generate a second ordered set of travel options using a second preference function, the second preference function being different from the first preference function;

select travel options from the second set, the selected travel options corresponding to a plurality of diverse travel requirements; and

combine the selected travel options to generate the diverse set of travel options.

45. The article of claim 44 further comprising instructions for causing a processor to generate a plurality of travel requirements,

wherein the computer-readable program portion for selecting a predefined number of best travel options from the first set further comprises for each travel requirement, selecting one or more travel options from the first set that satisfy that travel requirement, and

wherein the computer-readable program portion for selecting a predefined number of best travel options from the second set further comprises for each travel requirement, selecting one or more travel options from the second set that satisfy that travel requirement.

46. A method for generating a diverse set of travel options, the method comprising:

determining a candidate set of travel options, the candidate set of travel options being based on user input;

defining a set of diversity requirements, with defining comprising:

establishing a plurality of travel requirement templates, for each travel requirement template,

defining a plurality of travel requirements, each of the travel requirements corresponding to a different value of the respective travel requirement template to

produce the set of diversity requirements, and for each travel requirement in the set of diversity requirements,

selecting from the candidate set of travel options a travel option that satisfies that travel requirement;

combining the selected travel options for the travel requirements to generate the diverse set of travel options; and

displaying the diverse set of travel options to a user.

47. The method of claim 46 wherein values for a particular travel requirement template are based on the candidate set of travel options.

48. The method of claim 46 wherein the plurality of travel requirement templates include particular carriers, number of stops, outbound travel departing in a predefined time period, return travel departing in a predefined time period, or travel with an outbound departure on a first predefined date and a return arrival on a second predefined date.

49. The method of claim 48 wherein values for the travel requirement template of particular carriers with corresponding travel requirements including a first particular airline and a second, different particular airline.

50. An article of manufacture having computer-readable program portions embodied therein for generating a diverse set of travel options, the article comprising instructions for causing a processor to:

determine a candidate set of travel options, the candidate set of travel options being based on user input;

define a set of diversity requirements with instructions to define comprising instructions to:

establish a plurality of travel requirement templates, for each travel requirement template,

define a plurality of travel requirements, each of the travel requirements

corresponding to a different value of the respective travel requirement template to

produce the set of diversity requirements, and for each travel requirement in the

set of diversity requirements,

select from the candidate set of travel options a travel option that satisfies that

travel requirement;

combine the selected travel options for the travel requirements to generate the

diverse set of travel options; and

display the diverse set of travel options to a user.

51.   The article of claim 50 wherein values for a particular travel requirement template

are based on the candidate set of travel options.

52.   The article of claim 50 wherein the plurality of travel requirement templates

include particular carriers, number of stops, outbound travel departing in a predefined

time period, return travel departing in a predefined time period, or travel with an

outbound departure on a first predefined date and a return arrival on a second predefined

date.

53.   The article of claim 52 wherein values for the travel requirement template of

particular carriers with corresponding travel requirements include a first particular airline

and a second, different particular airline.